Ligation of the Common Carotid Artery for Malignant Recurrent Hemorrhage of the Vitreous.

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LIGATION OF THE COMMON CAROTID ARTERY FOR MALIGNANT RECURRENT HEMORRHAGE OF THE VITREOUS.*

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The object of this communication is to bring before this Section the subject of ligation of the carotid for the relief of a disease other than the vascular tumors of the orbit and lid in which this procedure is commonly employed. I refer to the rather infrequent cases of malignant, recurring vitreous hemorrhage.

The following example came under my observation a little over a year ago:

Patient.—B. K., 51, a healthy married woman of German birth.

History.—On the morning of Jan. 18, 1906, the patient noticed that the vision of her left eye was somewhat blurred. On the following day she applied for treatment at the Carney Hospital. Her family and previous history were negative. There was no evidence of hemophilia or of syphilis. There had never, to her knowledge, been any disease in her family and, as far as she knew, her eyes had always been normal. She had given birth to seven healthy children and her menses, always normal in character, had ceased four years previously.

Examination.—For the sake of brevity I will say here that several physical examinations made by members of the medical staff, at this time and during the succeeding year, were all absolutely negative. The heart and kidneys appeared entirely normal and there was no evidence of vascular disease. The blood pressure (Riva-Rocci) equalled 145 mm. The blood contained 5,568,000 red cells, 9,600 white, and 85 per cent. of hemoglobin. The patient was a stolid, well nourished woman with a good appetite and digestion.

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Ocular Examination.—The left eye was white, cornea, iris and lens normal, the pupil slightly dilated. The vitreous contained numerous small and large floating opacities. Situated about in the optic axis and best seen with a plus 12 glass was a peculiar membranous looking structure roughly square in outline, and suggesting an inverted pyramid in shape (base forward) rather than a flat septum. In color it was white, with irregular areas of black pigment along its borders, and on its surface were large splashes of fresh blood. Along the lower temporal border was a small hemorrhage extending into the vitreous. The retina and nerve head could not be seen. Vision: Counts fingers at one foot. Examination of the right eye showed a similar but somewhat smaller structure, situated in the same relative position and connected with the disc by a fine strand of grayish tissue. No vascularization could be made out. The vitreous was clear, and except for this structure nothing abnormal could be seen in any part of the eye. V. O. D. = 6/12 —, not improved by glasses. Increasing doses of mercury and iodid were prescribed, but seemed to have no lasting effect on the process. There was an occasional slight improvement and then would come a sudden diminution in vision caused by fresh hemorrhage on the membrane and increased clouding in the vitreous. By June the vision was reduced to the perception and localization of light, and the red reflex had entirely disappeared. On October 12 the patient again came to the clinic saying that two days previously the sight of the right eye had suddenly failed. Examination showed vitreous hemorrhage and large splashes of blood on the membrane. Vision = 3/60. The retina could barely be distinguished. Barring a greenish tinge to the iris the state of the right eye had not changed. She was taken into the hospital for observation and treatment. The course of the disease did not differ from that in the other eye. Under large doses of iodid and mercury the vision occasionally showed slight improvement only to fall off again from a fresh hemorrhage, which in each instance appeared to come from the membranous structure. Mercury and iodid gave place to lactate of calcium and large doses of gelatin,[1] and later to other drugs, over a period of three months. There was a steady loss of vision down to counting fingers at one foot, and it became increasingly evident that complete blindness would ensue were not energetic measures taken. Meanwhile, there was no sign of returning vision in the left eye.

Operation.—Remembering that in two somewhat similar cases, one reported by Mayweg[2] and one by Axenfeld,[3] ligation

1. We were unable at this time to estimate the coagulation power of the blood and treated her empirically on the assumption that it was retarded.

2. Bericht d. Ophth. Gesellschaft zu Heidelberg, 1889, 92.

3. Oberrhein. Aerzt., July 6, 1905; Münch. Med. Wochschr., 1905, lii.

of the common carotid had apparently checked the disease, I explained to the patient the dangers of such an operation and the uncertainty of the result, and on the other hand the probability of blindness under medical treatment alone. Her good health and absence of all signs of vascular changes were in her favor. She chose to take the risk, and on December 10, the right common carotid was ligated by Dr. H. H. Germain under ether anesthesia. At this time the vision equalled counting fingers at one foot. The patient made an uncomplicated recovery from the operation save for a slight rise in temperature. She was kept in bed for two weeks.

Postoperative History.—December 11: V. O. D., counts fingers at five feet.

December 12: V. O. D., counts fingers at fifteen feet. With the ophthalmoscope the red reflex was perceptibly brighter.

December 14: V. O. D., counts fingers at twenty feet.

December 17: V. O. D. = 6/30. It was possible to distinguish the retina with both the indirect and the direct methods. The vitreous had cleared up markedly and the membrane was clearly visible. No fresh hemorrhage could be seen.

December 27: Patient discharged from hospital. Vision = 6/30+. There were no fresh hemorrhages and the vitreous was clearing slowly.

To our great disappointment, two days later there was a sudden diminution of sight and examination showed the membranous structure to be almost covered with fresh blood and the vitreous very cloudy. V. O. D., counts fingers at one foot. The attack came on spontaneously and did not follow exertion or excitement. Since that time the course of the disease has been about the same as before the operation and the vision on March 8 was limited to hand movements directly in front of the eye. The red reflex has almost entirely disappeared, but it is still possible to see the membrane faintly and to note that it is covered with blood.

PREVIOUS CASES.

Mayweg,[2] at the twentieth meeting of the Heidelberg Society, reported the following case:

CASE 1.—A 17-year-old peasant had lost the sight of his left eye from repeated vitreous hemorrhages, although under capable treatment. Three years after the left eye first became involved, a similar process affected the right, and recurred four times. At the fifth attack he came to Mayweg, who found extensive hemorrhage into the vitreous and vision reduced to 20/200. There was no evidence of organic disease. In spite of energetic treatment there were six further recurrences and finally, ligature of the carotid was resorted to. This checked the process and eighteen months later the vitreous was clear and the vision = 20/40.

Case 2.—Axenfeld[3] saw a healthy girl, 24 years old, who had lost the sight of her right eye from persistent vitreous hemorrhages followed by secondary glaucoma. Several years later the left eye became affected and the vision reduced to hand movements. Ligation of the common carotid controlled the disease and three months later there had been no further hemorrhage. The vitreous cleared up very slowly. I have been unable to obtain the later history of this case.

Before proceeding to consider the operative treatment involved there are one or two interesting features of the case reported above which deserve a few words. As to the nature of the membranous structures there is an element of uncertainty. On the one hand they may have been the organized remains of vitreous hemorrhage which took place at an earlier period in the patient's life, and very likely this would have been the assumption had the patient been seen only after the involvement of the second eye. It does not appear, however, that such was the true nature of the case for the following reasons: The structures resembled each other closely and were symmetrically placed. They were situated in the line of Cloquet's canal and, in the right, a fine strand of grayish tissue could be seen (before blood obscured the vitreous), running back from the structure to the disc. There was no vascularization and absolutely no sign of disease in the chorioid or retina (O.D.). It seems probable that we have in this case the remains of embryonic structures. Vitreous hemorrhages are occasionally observed in connection with a persistent hyaloid artery, as, for instance, in the case reported by Hickman.[4] Furthermore, it is well recognized that undeveloped organs form a locus minoris resistentiæ. The assertion of the patient at her first visit that the sight of the right eye had never been more acute favors this view.

It is worthy to note that in this case each hemorrhage appeared to take place from the substance of the membrane.

The rapid improvement in vision from 1/300 to 6/30+ in one week is striking evidence of the temporary efficiency of tying the carotid in these cases. On the other hand, the recurrence, ten days later, shows how quickly the circulation can be re-established from

4. Ophthal. Rev., 1902, 85.

the collateral supply. That it was the operation which caused the improvement is hardly open to question.

For a time the patient was treated with lactate of calcium and gelatin on the theory that the coagulating power of the blood was diminished. As we were unable to determine then whether or not this was the case, and as there was no apparent improvement, this treatment was discontinued. Recently through the kindness of Dr. F. T. Lord, whom I here wish to thank, an estimation was made by Wright's method, and it was found that coagulation took place in 2 minutes and 50 seconds, the normal by this method being 1 minute 45 seconds to 2 minutes 10 seconds. Thinking that possibly the former preparation of calcium may not have been efficient, the patient has again been given this drug.

This method of determining the time of clotting is as yet in its infancy, but its great simplicity and availability give great promise. Although Wright and his assistants have indicated that retarded coagulation may be responsible for many and various lesions, there has as yet been little confirmatory evidence, still as in this case we have no other clue to the etiology, and as many other similar cases occur in which the causation is likewise obscure, the possibility of retarded coagulation as a cause is worthy of consideration in the future. Therefore, it would seem to be advisable to ascertain the clotting time in all such cases, and if it be slow the administration of calcium salts is indicated and may prove of marked benefit to the patient.

Whether we are justified, after medical treatment has failed, in proposing ligation of the carotid to these patients is the question which more nearly concerns us here. Our first consideration may well be the danger of the operation. We have a large mass of statistics on the subject of carotid ligation and they are somewhat complicated, owing to the fact that in pre-antiseptic days the danger of sepsis and of secondary hemorrhage had to be seriously considered, and added very materially to the mortality of the operation. Moreover, the disease for which the operation is performed has a marked influence on the mortality. It would seem fair to assume about the same rate of mortality after ligation for the cure of vitreous hemorrhage as that after the same operation for the relief of pulsating exophthalmos. Keller,[5]

5. Inaug. Diss. Zurich., see Michel's Jahrs., 1898, 606.

from the Zurich clinic, gives 4 per cent. in 31 cases. Slomann,[6] from 95 cases, some of the patients of which were operated on in the pre-antiseptic era, gives a mortality of 10 per cent. Werner[7] 10 per cent., Le Fort[8] 12 per cent., Murray[9] 10 per cent., de Schweinitz[10] 10 per cent.

For other diseases the mortality is much greater, as would be expected when we take into account the serious character of the lesions which call for this operation. Keller[5] gives 34-43 per cent., Le Fort[8] 43 per cent., Murray[9] 25 per cent. The total results of carotid ligation as quoted by Barnard and Rugby[11] are as follows: Tillman 31 per cent., Zimmermann 31 per cent., Pilz 18 per cent., and Friedlander 13 per cent.

As regards the dangers and complications of the operation, Erichsen, quoted by Barnard and Rugby,[11] says that cerebral symptoms occur early or late in 25 per cent. of the cases. The dangers of sepsis and hemorrhage may now be disregarded.

Blindness, from obstruction of the arteria centralis retinæ, has been noted by Elschnig,[12] Siegrist,[13] Gifford[14] and Uhthoff,[15] and has apparently in the majority of instances been caused by lodgment in this vessel of a fragment detached from the thrombus in the carotid. In any event this is an uncommon accident, for in the ordinary case closure of the carotid causes but a temporary disturbance of the retinal circulation. Uhthoff[15] and Hansell[16] have observed the temporary obliteration of the retinal vessels at the moment of ligation.

Sattler,[17] Wagenmann[18] and Silex[19] have seen lesions of the cornea, which have been referred both to trauma and to trophic disturbance. Axenfeld[20] has reported homonymous hemianopsia following ligation, and

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6. Doctordiss. Copenhagen, see Michel's Jahresbericht, 1898, 612.
7. Inaug. Diss. Tübingen, see Michel's Jahresbericht, 1898, 617.
8. Rev. de Chir., 1890, May and June.
9. Ann. of Surg., 1904, 421.
10. Quoted in Modern Ophthalmology; Ball, 640.
11. Ann. of Surg., 1904, 649.
12. Arch. f. Ophth., 1893, xxxix, 151.
13. Ber. d. Ophth. Gesell. z. Heidelberg, 1898, 10.
14. Ophth. Rec., 1899, 595.
15. Ber. d. Ophth. Gesell, 1898, 21, 22.
16. The Journal A. M. A., 1905, 536.
17. Quoted by Siegrist (13).
18. Quoted by Siegrist (13).
19. Ber. d. Ophth. Gesell., 1898, 23.
20. Ber. d. Ophth. Gesell., 1898, 22.

Michel[21] has seen cataract following thrombosis of the carotid.

In the case of a patient operated on in Boston hemiplegia and death followed carotid ligation and the autopsy showed the absence of the circle of Willis. All these complications are, however, of rare occurrence and need not be considered here.

Having spoken of the dangers and mortality of the operation, we must now consider what chances the patient has of benefiting by it, and here we have but little information to guide us. In pulsating exophthalmos we may assume from the statistics 50 to 80 per cent. of cures from the operation, but in recurrent vitreous hemorrhage we have only the three cases above on which to base an estimate. Mayweg's was successful, Axenfeld's successful up to the end of three months (later progress unknown), and the case reported here was a failure. The two favorable ones occurred in youth, mine in middle age.[22] In all three it was done as a last resort. On the one hand stands an operation of considerable risk and of uncertain value; on the other is almost certain blindness. In making a decision, the age of the patient and the condition of the vascular system are of great importance. In my own case no lesions could be found, but her age made it possible that they were present. We estimated her risk at from 15 to 20 per cent. In all cases with healthy vessels and no complications, and where the patient has chosen to run the risk after an impartial statement of the facts has been given, I believe that the operation is justifiable. Naturally this refers only to those cases in which the vision of one eye has already been lost and in which medical treatment offers small hope of saving the second eye.

Additional Note (June 1, 1907).—Since April 1 the condition of the patient has remained practically unchanged. V. O. D., hand movements at one foot. The second course of treatment with calcium lactate was no more successful than the first. Numerous estimations of the coagulation time showed a minimum of 2 min. 30 sec., which did not decrease even when large doses were given.[23]

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21. Quited by Siegrist (13).

22. Pollack (Michel's Jahresbericht, 1900, 368), has reported a case in which the artery was tied in a patient 66 years of age, and the second one ligated five years later without accident.

23. The technic used was that described in the Lancet, 1905, 1906.

In this connection I find that in four cases of vitreous hemorrhage Paton[24] and Paramore[24] found diminished clotting time, and Wright suggested that in these instances the hemorrhage might be due to thrombosis taking place in a small vein. Clearly the part played in this disease by abnormal coagulation of the blood is purely a matter of speculation at the present time and remains for future investigation to solve.

Professor Axenfeld has kindly written me that the progress of his case is still satisfactory. There have been no fresh hemorrhages and the vision two months ago was 6/12. I understand that he has had the carotid tied in a second case, but that it is too early yet to judge of the result. A detailed history of his first case may be found in the dissertation of Fraülein Bieber,[25] and from her paper I take this occasion to quote Siegrist's figures of 6 per cent. mortality in 997 cases of carotid ligation gathered from the literature. This writer (Siegrist) is of the opinion that if the patient's condition be good and if compression of the artery be carried out methodically before the operation, then ligation may be performed without serious danger to the patient.

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24. Lancet, 1905, 1249.
25. Inaug. Diss. Freiburg. Berlin, 1906.